Sustainable Seas Expeditions
Cruise Plan Format – Table of Contents

Sustainable Seas Expeditions
Cruise Plan Format

May 16, 1999

Channel Islands National Marine Sanctuary
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CRUISE INSTRUCTIONS: Draft

NOAA Ship: McARTHUR Cruise Number: AR-99-05

Cruise Title: Sustainable Seas Expeditions
Cruise Dates: May 24 - June 5, 1999
Study Area: Channel Islands National Marine Sanctuary (CINMS)

Sponsoring Institution: NOAA's National Ocean Service (NOS), Channel Islands National Marine Sanctuary (CINMS), Sustainable Seas Expeditions (SSE), National Geographic Society (NGS)

Cruise Description and Objectives: The Channel Islands National Marine Sanctuary Sustainable Seas Expedition is designed to increase public awareness of NOAA's Channel Islands National Marine Sanctuary, draw attention to the need for site characterization of the Sanctuary, and enhance conservation efforts of the resources within the Sanctuary. Research undertaken during the mission involves investigating benthic habitats previously mapped with sidescan sonar in order to "ground-truth" sidescan data. The distribution of organisms will be related to the underlying geologic character of the seafloor. Our goal is to develop dynamic models to link both small- and large-scale study results for application directly to population and community management of living marine resources. All encounters with four select species of rockfish (vermillion, flag, cowcod, and bocaccio) will be quantified. Video footage from all dives will be evaluated for invertebrate assemblages for inclusion in the Santa Barbara Museum of Natural History's Invertebrate Taxonomic Atlas. When possible, rock samples will be collected and examined for invertebrates. Research dives may also be conducted to collect data on spawning habitat of market squid (*Loligo opalescens*). Market squid are an important fishery resource in California, yet little is known about the viability of squid populations under current harvest levels.

Synopsis of Scientific Measurements: Scientists will record data on fish and invertebrate species encountered during dives and collect one rock sample from each dive; collect side scan sonar data during nighttime side scan operations and oceanographic data during CTD casts.

Sustainable Seas Expedition

- Use the DeepWorker to complete video transects characterizing habitats, benthic fish and invertebrate communities
- Estimate distribution and abundance of fishes with video and visual transects using DeepWorker
- Collect information and images to be used in media, education and outreach efforts

Chief Scientist: Dr. Sylvia Earle

1.0 ORGANIZATIONAL STRUCTURE –

1.1 STRUCTURE

- *Commanding Officer* - Final approval authority for all operations. Both the Commanding Officer and Dive Supervisor must agree that conditions are acceptable for the submersible to be launched.

- *Dive Supervisor* - Responsible for the procedures and coordination of all dive operations. Both the Commanding Officer and Dive Supervisor must agree that conditions are acceptable for the submersible to be launched.

- *Chief Scientist* - Responsible for collaborating with the CO, Dive Supervisor, and Mission Coordinator to implement the Cruise Plan and to develop the "Plan of the Day" (POD). The Chief Scientist has decision-making authority for any departures from the schedule, planned activities, or personnel.

- *Mission Coordinator* - Responsible for collaborating with the CO, Dive Supervisor, and Chief Scientist to implement the Cruise Plan and to develop the POD. The Mission Coordinator is also responsible for organizing and overseeing the processing, storage, and transmittal of data and information collected during submersible dive operations.

- *Principal Investigator* - Responsible for the individual project content.
- *Pilot* - Certified DeepWorker pilot approved for the specific mission dive.
- *Mission Log Coordinator* – Responsible for compiling the Mission Log for the NGS SSE Web site.

1.2 PROTOCOL

Dive Authority – The Commanding Officer and the Dive Supervisor will make the final decision on dive operations.

Project implementation – The CO, Dive Supervisor, Chief Scientist, Mission Coordinator, and other required personnel, will develop the POD based on the Cruise Plan. Both the Commanding Officer and Dive Supervisor must agree that conditions are acceptable for the submersible to be launched, while the Chief Scientist has decision-making authority for any departures from the schedule, planned activities, or personnel.

2.0 OVERVIEW OF OPERATIONS

Partners in the CINMS Sustainable Seas Expedition include the US Geological Survey, the University of California at Santa Barbara, the Santa Barbara Museum of Natural History, the Regional Alliance for Information Networking (RAIN), and the Santa Barbara Maritime Museum. The mission will begin May 25th and be completed by June 5th, 1999. Mission activities will occur around the four northern Channel Islands (Anacapa, Santa Cruz, Santa Rosa, and San Miguel Islands). During daytime hours scientists and educators will be operating a one person autonomous submarine called the DeepWorker to characterize subtidal habitats and organism distribution in the vacinity of the CINMS. CTD profiles, discrete water sample collection, and optics casts will be collected at various times throughout the day. During nighttime operations sidescan sonar data will be collected from the sea floor.

3.0 ITINERARY

MAY

24 McARTHUR arrives in Port Hueneme
1200 Scientists arrive and begin loading scientific gear
1900-2100 Student Summit (in Santa Barbara)

25 DeepWorker 2000 check-out dives (Nuytco staff, pilots)

26 *Check-out Dives - Smuggler's Cove, East end of Santa Cruz Island*
Alternatives: Anacapa/Santa Cruz Passage (33 59.809; 119 28.770 or 34 00.809; 119 29.623); back side of Santa Cruz; back side of Anacapa Island
0700 Pre-dive meeting in wardroom - DS, CS, Pilots, OPS, CO, MC
0800-1000 Check-out dive (Tim Friend, pilot)
0900 Ed Cassano picked up by *Xantu* to conduct dry run of May 27 activities at Anacapa Island
1130-1330 Check-out dive (Guy Cochrane, pilot)
1400 Ed Cassano return to MAC
1500-1700 Check-out dive (Sarah Fangman, pilot)
1730 CTD cast/optics
1800-0600 Sidescan sonar activities (Footprint)

27 *Education/Outreach Day - Landing Cove, Anacapa Island*
0700 CTD cast/optics (MAC at anchor)
0730 Pre-dive meeting in wardroom - DS, CS, Pilots, OPS, CO, MC
0900 *Ballena* arrives with VIPs/Media to MAC (transfers lunch for guests to MAC)
0915 RHIB Pickup *Ballena* Captain
1000 Project #5 - Dive #1 (Francesca Cava, pilot)
1015 DeepWorker stationary on bottom
1030 *Sundown* alongside MAC - Media/VIP A & B transferred to *Sundown* en route to *Vision* and Anacapa Island
1115 DeepWorker stationary on bottom
1130 DeepWorker en route to Anacapa Cove
1200 DeepWorker meets divers at Anacapa Cove
1215 DeepWorker transit to MAC
1250 DeepWorker stationary on bottom
1300 *Sundown* alongside; Media/VIP A & B board MAC
Lunch and press set-up
1330 DeepWorker returns to MAC
1345 Press conference - 35 person max (Hosts: Francesca Cava, CO, Ed Cassano)
1415 Tours of MAC/Interviews
Prep for second DeepWorker dive
1445 RHIB transports *Ballena* captain
1500 *Ballena* alongside MAC - Media/VIP A & B board
1515-1800 Projects #1 & 2 - Dive #1 (Tim Friend, pilot)
1830 MAC to Ventura (or RHIB - ship decision)
2000-0600 Sidescan sonar activities

28 *Check-out Dives - Anacapa/Santa Cruz Passage (33 59.809; 119 28.770 or 34 00.809; 119 29.623) & Projects # 1 & 2 (time permitting)*
0700 Pre-dive meeting in wardroom - DS, CS, Pilots, OPS, CO, MC
0700 CTD cast/optics
0800-1000 Check-out dive (Ed Cassano, pilot)
1130-1330 Projects #1 & 2 - Dive #2 (Guy Cochrane, pilot)
1500-1730 Projects #1 & 2 - Dive #3 (Sarah Fangman, pilot)
1800 CTD cast/optics
1900-0600 Sidescan sonar activities

29 *Research Dives - Anacapa Island transects (Projects #1 & 2)*
0700 Pre-dive meeting in wardroom - DS, CS, Pilots, OPS, CO, MC
0700 CTD cast/optics
0800-1230 DeepWorker transect; Projects #1 & 2, Dive #4 (Ed Cassano, pilot)

1400-1730 DeepWorker transect; Projects #1 & 2, Dive #5 (Guy Cochrane, pilot)
1800 CTD cast/optics
1900-0600 Sidescan sonar activities

30 *Research Dives - Anacapa Island transect (Projects #1 & 2)/Footprint (Project #4)*
0700 Pre-dive meeting in wardroom - DS, CS, Pilots, OPS, CO, MC
0700 CTD cast/optics
0800-1030 Projects #1 & 2 - any dives not completed in previous days (Guy Cochrane, pilot)
1230-1500 Project # 4 - Dive #1 (Ed Cassano, pilot)
1630-1900 Project #4 - Dive #2 (Sarah Fangman, pilot)
1930 CTD cast/optics
2030-0600 Sidescan sonar activities

31 *Research Dives - Footprint (Project #4)*
0700 Pre-dive meeting in wardroom - DS, CS, Pilots, OPS, CO, MC
0700 CTD cast/optics
0800-1030 Project #4 - Dive #3 (Ed Cassano, pilot)
1200-1430 Project #4 - Dive #4 (Kip Evans, pilot)
1600-1830 Project #4 - Dive #5 (Sarah Fangman, pilot)
1900 CTD cast/optics
2000-0600 Sidescan sonar activities

JUNE

1 *SSE Day - Platform Gail Dive*
0700 Pre-dive meeting in wardroom - DS, CS, Pilots, OPS, CO, MC
0800-1230 Project #3 - Dive #1 (Sylvia Earle, pilot)
1400-1730 Project #4 - Dive #6 (Francesca Cava, pilot)
1800 CTD cast/optics
1900-2400 Sidescan sonar activities
2400 Transit to Santa Barbara

2 *Heal the Ocean Outfall dive at Santa Barbara Outfall* (no night ops)
0630 *Xantu* departs Santa Barbara Harbor with VIPs, project participants for McARTHUR (10-15 people, probably will require 2 trips)
0700 *Xantu* offloads onto McARTHUR
0700 Pre-dive meeting in wardroom - DS, CS, Pilots, OPS, CO, MC
0800-1030 DeepWorker dive on Santa Barbara outfall (Sylvia Earle, pilot)
1100 Complete DeepWorker decontamination/begin prep for second dive)
1130 Media departs McARTHUR via *Xantu*, McARTHUR to Montecito site
1200-1430 DeepWorker dive on Montecito outfall and adjacent reef (Francesca Cava, pilot)
1500 Remaining party departs McARTHUR aboard *Xantu*
1900 Coral Casino reception
2400 McARTHUR departs Santa Barbara

3 *Night dives - Location: 33 59.809, 119 28.770; reef in 150-160'.*
0700 Pre-dive meeting in wardroom - DS, CS, Pilots, OPS, CO, MC
0700 CTD cast/optics
0800-1030 DeepWorker transect at Project #7 site (TBD, pilot)
1100 Live Internet Chat from MAC
1230 CTD cast/optics
1300-1900 Sidescan sonar activities
1900 Pre-dive meeting in wardroom - DS, CS, Pilots, OPS, CO, MC
2000-2130 Project #7 - Dive #1 (Ed Cassano, pilot)
2300-2430 Project #7 - Dive #2 (Sarah Fangman, pilot)

4 0200-0330 Project #7 - Dive #3 (Guy Cochrane, pilot)
0400-1100 Sidescan sonar activities
1300 Depart for Santa Barbara
1600 Arrive Santa Barbara
1800 Party at Leadbetter for ship crew, CINMS/SSE staff, scientific party

5 *Open House Santa Barbara Maritime Museum and McARTHUR*
1030-1230 Mock DeepWorker in Big Dog Parade
1100 Preview tour for VIPs (15 person max)
Ballena shuttle for VIPs; *Xantu* shuttle for media
1130 Pre-dive meeting in wardroom - DS, CS, Pilots, OPS, CO, MC
1200 DeepWorkers transit to Santa Barbara Harbor (pilots: Sylvia Earle, Ed Cassano)
Santa Barbara Harbor Patrol escort
Danny C. on standby in case of emergency
1300 DeepWorkers arrive in Santa Barbara Harbor
1330 Chumash welcoming ceremony
1400-1500 Press Conference on steps of Santa Barbara Maritime Museum
1300-1600 Public Open House aboard McARTHUR (*Rachel G.* charted to run shuttle from accommodations dock to McARTHUR)
1000-1700 Public Open House at Santa Barbara Maritime Museum
1630 McARTHUR departs Santa Barbara

4.0 Project Descriptions

Project descriptions provide summary information on each project. Appendix A will list geographic positions of transects, sites, and stations.

4.1 DIVE PROJECTS

Project #1: Transects on the north side of Anacapa Island
Principal Investigator: Guy Cochrane
Objective: To investigate benthic habitats previously mapped with sidescan sonar in order to "ground-truth" data.
Tasks: Dive transects taking still and video footage of benthic habitats. Collect rock samples.

Dive #	Pilots	Location (start, end)	Max Dive Depth	Depth to Bottom	Duration
1	*Tim Friend*	*119.3690,34.0510* *119.3690,34.0210*	*377'*	*377'*	*2.5 hrs.*
2	*Guy Cochrane*	*119.3433,34.0450* *119.3433,34.0283*	*403'*	*403'*	*2.5 hrs.*
3	*Ed Cassano*	*119.3383,34.0083* *119.3383,34.0250*	*285''*	*285'*	*2.5 hrs.*
4	*Sarah Fangman*	*119.4267,34.0367* *119.4267,34.0200*	*278'*	*278'*	*2.5 hrs.*
5	*Guy Cochrane*	*119.3690,34.0510* *119.3690,34.0210*	*377'*	*377'*	*2.5 hrs.*

Potential Safety Concerns: Currents possible
Alt Site: NA
Equip Sub: None
Equip Ship: None
Other Considerations: Sidescan data provided by Guy Cochrane

Project #2: This work will be conducted in conjunction with the dives in Project #1.
Principal Investigator: Milton Love/Donna Schroeder
Objective: To relate the distribution of organisms to the underlying geologic character of the seafloor. Develop dynamic models to link both small- and large-scale study results for application directly to population and community management of living marine resources. Produce habitat classification scheme for common use in all subtidal habitats.
Task: Collect biological data in areas where sidescan and seismic reflection surveying has been completed to describe the relationship between physical features and deep-water biological communities. Collect rock samples.

Dive #	Pilots	Location (start, end)	Max Dive Depth	Depth to Bottom	Duration
1	*Tim Friend*	*119.3690,34.0510* *119.3690,34.0210*	*377'*	*377'*	*2.5 hrs.*
2	*Guy Cochrane*	*119.3433,34.0450* *119.3433,34.0283*	*403'*	*403'*	*2.5 hrs.*
3	*Ed Cassano*	*119.3383,34.0083* *119.3383,34.0250*	*285'*	*285'*	*2.5 hrs.*
4	*Sarah Fangman*	*119.4267,34.0367* *119.4267,34.0200*	*278'*	*278'*	*2.5 hrs.*
5	*Guy Cochrane*	*119.3690,34.0510*	*377'*	*377'*	*2.5 hrs.*

		119.3690,34.0210			

Potential Safety Concerns: Currents possible
Alt Site: NA
Equip Sub: None
Equip Ship: None
Other Considerations: Sidescan data provided by Guy Cochrane

Project #3: Platform Gail
Principal investigator: Donna Schroeder/Milton Love
Objective: Collect data on fish and invertebrate assemblages on Platform Gail.
Task: Dive pattern on structure of Platform Gail.

Dive #	Pilots	Location	Max Dive Depth	Depth to Bottom	Duration
1	*Sylvia Earle*	*119.4020 34.1250*	*740'*	*740'*	*2.5 hrs.*

Potential Safety Concerns: Entanglement
Alt Site: "Footprint" 33 degrees, 57.525, 119 degrees, 28.905
Equip Sub: None.
Equip Ship: None.
Other Considerations: Permission granted by Chevron (contact: Del Clement, 805-658-4419). Video of previous Delta dives on this site are available from Donna Schroeder

Project #4: Footprint Reef
Principal Investigator: Donna Schroeder
Objective: Collect data on fish and invertebrate assemblages on "Footprint".
Task: Transects to gather data on benthic assemblages.

Dive #	Pilots	Location	Max Dive Depth	Depth to Bottom	Duration
1	*Ed Cassano*	*119.4818 33.9586*	*700'*	*300'-700'*	*2.5 hrs.*
2	*Sarah Fangman*	*119.4818 33.9586*	*700'*	*300'-700'*	*2.5 hrs.*
3	*Ed Cassano*	*119.4818 33.9586*	*700'*	*300'-700'*	*2.5 hrs.*
4	*Kip Evans*	*119.4818 33.9586*	*700'*	*300'-700'*	*2.5 hrs.*
5	*Sarah Fangman*	*119.4818 33.9586*	*700'*	*300'-700'*	*2.5 hrs.*
6	*Francesca Cava*	*119.4818 33.9586*	*700'*	*300'-700'*	*2.5 hrs.*

Potential Safety Concerns: Currents possible
Alt Site: Anacapa/Santa Cruz passage - 33 degrees, 59.809, 119 degrees, 28.770; 150-160'
or 34 degrees, 00.809, 119 degrees, 29.623; 160'-170'
Equip Sub: None
Equip Ship: None
Other Considerations:

Project #5: Education/Outreach Dive
Coordinator: Ed Cassano

Objective: To conduct a media and education event to highlight the Channel Islands National Marine Sanctuary and the Sustainable Seas Expedition.
Task: Conduct DeepWorker transect ending amongst GAFC divers.

Dive #	Pilots	Location	Max Dive Depth	Depth to Bottom	Duration
1	*Francesca Cava*	*119 21.05, 34 01.43 119 21.54, 34 01.10*	*174'*	*174'*	*2.5 hrs.*

Specific Request from Ship: DeepWorker would be launched for two dives. Lunch aboard the McARTHUR and tour of the ship's facilities for invited guests.
Other Considerations: Refer to Appendix A for detailed plan of this event.

Project #6: Squid Spawning Habitat - This project will be done if all others are completed.
Principal investigator: Ed Cassano
Objective: Collect data on spawning habitat of market squid (*Loligo opalescens*). Market squid are an important fishery resource in California yet little is known about the viability of squid populations under current harvest levels.
Tasks: Dive transects in squid spawning habitat. Collect rock samples**.**

Dive #	Pilots	Location	Max Dive Depth	Depth to Bottom	Duration
1	*TBD*	*Northwest end of Santa Cruz Island*	*315'*	*315'*	*2.5 hrs.*
2	*TBD*	*West end of Santa Cruz Island*	*145'*	*145'*	*2.5 hrs.*
3	*Alternate site*	*Southeast end of Santa Rosa Island*	*290'*	*290'*	*2.5 hrs.*

Potential Safety Concerns: Currents possible
Alt Site: At least one of these three sites should be workable under most weather conditions.
Equip Sub: None
Equip Ship: None
Other Considerations: Exact locations of dives for this project will be determined based on aerial surveys of the squid fleet currently being conducted by CINMS.

Project #7: Night Dives
Coordinator: Ed Cassano
Objective: To familiarize pilots with night dive operations.
Tasks: Conduct three night dives.

Dive #	Pilots	Location	Max Dive Depth	Depth to Bottom	Duration
1	*Ed Cassano*	*119.4795 33.9968*	*160'*	*160'*	*1.5 hrs.*
2	*Sarah Fangman*	*119.4795 33.9968*	*160'*	*160'*	*1.5 hrs.*
3	*Guy Cochrane*	*119.4795 33.9968*	*160'*	*160'*	*1.5 hrs.*

Potential Safety Concerns:
Alt Site: 119.4937, 34.0135
Equip Sub: None
Equip Ship: None

Other Considerations:

4.2 OTHER PROJECTS

Event Name: Regional Alliance for Information Networking (RAIN)
Purpose: To bring the Sustainable Seas Expedition to students and the general public via the internet.
Primary Participants: Timothy Tyndall, RAIN Director
Date and Time: Ongoing throughout the SSE Mission
Specific Request from Ship: This project includes uplink activities that may necessitate ship support.
Other Considerations:

Event Name: Open House aboard McARTHUR
Purpose: To provide public with opportunity to tour McARTHUR; view DeepWorker
Primary Participants: Sylvia Earle, Francesca Cava, Ed Cassano, Sarah Fangman, Laura Francis, Guy Cochrane, Eric Hochberg
Date and Time: Saturday June 5; 1300-1600
Alternative Date and Time: NA
Specific Request from Ship: Launch and recover DeepWorker (DeepWorker will be brought to the steps of the Santa Barbara Maritime Museum for an open house). Public tours of the McARTHUR. CINMS will charter a vessel to shuttle passengers from the Santa Barbara Harbor to the McARTHUR.

4.3 ADDITIONAL PROJECTS - Any other work done during the cruise period will be subordinate to the main project and performed so as to not interfere with that outlined in these instructions. The Chief Scientist will be responsible for determining the priority of additional work relative to the main project.

Project Title: Taxonomic Atlas
Principal Investigator: Eric Hochberg
Objective: The Taxonomic Atlas Project involves exploring and monitoring benthic invertebrates at several sites in the Channel Islands National Marine Sanctuary, with the goal of discovering and describing new species.
Task: At least one rock will be collected per dive to be investigated for invertebrates.
Location: Entire mission
Alt Site: N/A
Equip Ship: None
Equip Scientific Party: Collection bottles and preservatives.
Other Considerations: None

Project Title: Filming for Santa Barbara Maritime Museum's Submersible Simulator
Principal Investigator: Robert Schwemmer
Objective: To gather broadcast quality footage for the SBMM submersible simulator.
Task: Gather footage during DeepWorker dives.
Location: During all dives
Alt Site: N/A
Equip Ship:
Equip Scientific Party: Video and still cameras on DeepWorker
Other Considerations: None.

Project Title: Sidescan sonar investigations
Objective: Mapping the benthic habitats of the Channel Islands National Marine Sanctuary.
Task: Nighttime operations of sidescan sonar to opportunistically map additional areas of the Channel Islands National Marine Sanctuary.
Principal Investigator: Guy Cochrane
Location: Dive sites
Date and Time: May 25 - June 4; approximately 1900-0600
Equip Ship: Technician to run winch
Equip Scientific Party: Sidescan sonar, winch, laptop computers

Project Title: Plumes and Blooms - An ocean color assessment of the Santa Barbara Channel
Principal Investigator: David Siegel and Michael Neumann, UCSB
Objective: Collect detailed, state-of-the-art optical, chemical and biological measurements to help understand and model the color of the surface waters of the Santa Barbara Channel. The primary goal of the Plumes and Blooms research program is to develop numerical algorithms to relate the satellite-sensed ocean color signal to useful quantities for ocean scientists and coastal zone managers.
Task: Conduct CTD casts
Location: Opportunistic, depending on location of other operations
Date and Time: May 26 - June 4
Equip Ship: Winch for launch and deployment of CTD; Request assistance of McARTHUR survey technician
Equip Scientific Party: CTD, Analytical Spectral Device (ASD), Tethered Spectral Radiometer Buoy (TSRB), Profiling Reflectance Radiometer (PRR), filtering equipment.

5.0 OPERATIONAL PLANS

The following operational plans can only be considered a guide as to how the Chief Scientist expects the project to progress without being able to predict the weather, operational and scheduling problems, and equipment failures. Appendix A will list geographical positions of transects, sites, and stations.

5.1 SSE PROJECTS –All dive projects will include visual observation, as well as video and voice documentation. Each pilot will be required to stop every 10-15 minutes to perform system checks and communicate with the dive crew.

5.2 ADDITIONAL PROJECTS –

5.2.1. The Plumes and Blooms Study will include CTD profiles, discrete water sample collection, and optics casts (TSRB and PRR). The ship will need to position such that the sun is on the stern for all optics casts.

The CTD casts require the use of the ship's winch. Casts will be to within 5 meters of the bottom. Bottom depth will be determined by both CTD depth transducer and ship-board depth indicators. Depending on bottom depth, casts will vary from 10 to 20 minutes. Deployment will be off the stern and will require assistance of at least one deck-hand. On the upcast, the winch operator will be asked to stop at predetermined depth intervals to obtain a water sample. The ship's seacable will need to have both a mechanical and electrical termination. Electrical termination should be a female, high-pressure, four-pin connector. Operation can be done from either the Ocean Lab or bridge electronics room.

Discrete water samples will be collected on the up-cast of each CTD cast. Filtering and preliminary processing of samples will need to be done immediately following collection. UCSB will provide a filtration system. The Ocean Lab is an ideal location for set-up and operation of this system. Following filtration, samples will need to be placed in a ship's freezer.

A tethered spectral radiometer buoy (TSRB) will be deployed off the stern after the CTD is aboard and secured. The unit consists of a deck unit, a laptop computer, and in-water unit. The deck unit and laptop computer will require 110 volt AC power for operation. The starboard, aft, Ocean Lab is an ideal location for operation of this equipment. GPS with NMEA data stream (RS232) is needed for the TSRB deck-unit. The in-water unit is secured to the ship via a 60-meter conducting umbilical. After the buoy is deployed over the stern, the McArthur will need to steam forward, distancing the ship from the buoy. The TSRB will remain deployed until the deployment and recovery of the PRR is completed. Deployment and operation can be achieved by two people and will not require crew assistance. Deployment and recovery will take approximately 15 minutes.

A profiling reflectance radiometer (PRR) will be deployed off the stern while the TSRB is collecting data. The unit consists of a deck unit, laptop computer, surface unit, and under-water unit. The deck unit and laptop computer will require 110 volt AC power for operation. The starboard, aft, Ocean Lab is an ideal location for operation of this equipment. The surface unit will need to be mounted where it will not be affected by the ship's shadow. The under-water unit is a free falling instrument secured to the ship via a 200 meter conducting umbilical. The instrument is drifted out approximately 20 meters from the ship while the ship slowly steams forward. Once data acquisition begins the instrument is allowed to free-fall while the operator manually pays out the umbilical. The PRR profiles to no more than 100 meters. Deployment and recovery takes approximately 15 minutes. Deployment and operation can be achieved by two people and will not require crew assistance.

5.2.2 Sidescan sonar operations

Operations will typically start at 1900 by transiting to the start of sidescan line. Near start of line the ship will slow to 1 knot, turn into the weather to deploy the sidescan fish (estimated to require about fifteen minutes for deployment). When the fish is deployed, the ship will maneuver to a fixed heading on a track line. Track lines will be shot at 3.5 knots. Track lines are approximately 10 kilometers long. A survey of parallel lines (approximately 10 parallel track lines) will be shot per night. The fish is typically flown 20-40 meters off the bottom, depending on water depth. Therefore operations require a winch operator on duty at all times. Track lines will be provided a day in advance (depending on weather, dive operations, etc.). Ship must remain within 50 meters of the track line during shooting. Course changes of more than ten degrees are to be avoided for data quality purposes. We expect to work in water depths of 50-200 meters.

5.2.3 Taxonomic Atlas

Rock samples will be collected during all DeepWorker dives. Samples will be stored in formalin-filled jars.

6.0 CONTACT PERSONNEL

Scientific Operations:
NAME

Chief Scientist:
Dr. Sylvia Earle and or Francesca Cava
Sustainable Seas Expeditions
735 State Street, Suite 305
Santa Barbara, CA 93101

Mission Coordinator:
LCDR Ed Cassano
Channel Islands National Marine Sanctuary
113 Harbor Way
Santa Barbara, CA 93109
Office - (805) 966-7107
Fax - (805) 568-1582
Cell - ((805) 689-5161
Pager - (800) 715-3597

Ship Operations:
NOAA Pacific Marine Center
LT Dana Wilkes
1801 Fairview Ave, E.

Seattle, WA, 98102
Office - 206-553-4548 Fax - 206-553-1109

7.0 SCIENTIFIC PERSONNEL

7.1 The Chief Scientist is authorized to alter the scientific portion of this cruise plan with the concurrence of the Commanding Officer, provided that the proposed changes will not: (1) jeopardize the safety of personnel or the ship (2) exceed the time allotted for the cruise (3) result in undue additional expense or (4) change the general intent of the project.

7.2 PARTICIPATING SCIENTISTS

NAME	Gender/Nationality	Position	Project	Organization	Date*
Sylvia Earle	F/USA	Chief Scientist	SSE	SSE/NGS	June 1
Francesca Cava	F/USA	Project Manager	SSE	SSE/NGS	May 25-26
Gale Mead	F/USA	Mission Log Editor	SSE	SSE/NGS	May 24-26 June 1-4
Sarah Fangman	F/USA	Pilot	SSE	NOS/CINMS	
Donna Schroeder	F/USA	P.I.	Benthic Habitats	UCSB	
Shauna Bingham	F/USA	Vol. Coordinator	SSE	NOS/CINMS	June 1
Julie Goodson	F/USA	Edu. Coordinator	SSE	NOS/CINMS	May 29-31
Misty Gonzales	F/USA	Intern	SSE	UCSB	May 27-28
Kathryn Hintergardt	F/USA	Webmaster	SSE	NOS/CINMS	May 27-28
Krista Ehrenclou	F/USA	Intern	SSE	UCSB	May 29-30
Claire Johnson	F/USA	SSE Team	SSE	SSE	May 29-30
Anne Walton	F/USA	Mgmt Plan Coord.	SSE	NOS/CINMS	June 2-3
Kip Evans	M/USA	Photographer	SSE	SSE/NGS	May 24-26, 31; June 1
NUYTCO	M/USA		SSE	Nuytco	
NUYTCO	M/USA		SSE	Nuytco	
NUYTCO	M/USA		SSE	Nuytco	
Edward Cassano	M/USA	Mission Coord.	SSE	NOS/CINMS	
Guy Cochrane	M/USA	P.I./Pilot	Benthic Habitats	USGS	
Michael Neumann	M/USA	P.I.	P&B	UCSB	
Tim Friend	M/USA	Journalist/Pilot	SSE	USA Today	May 24-28
Ben Waltenberger	M/USA	GIS Specialist	SSE	NOS/CINMS	May 27-28
Bob Schwemmer	M/USA	Cultural Res. Coord.	SBMM	NOS/CINMS	May 31
Eric Reeder	M/USA	Intern	SSE	UCSB	June 2-3
Jesse Swanhuyser	M/USA	Intern	SSE	UCSB	May 29-30
Adam Petusky	M/USA	CINMS Vessel Ops	SSE	NOS/CINMS	June 2-3

7.3 PARTICIPATING TECHNICIANS

NAME	Gender/Nationality	Project	Organization	Date*
Mike Boyle	M/USA	SSS	USGS	

7.4 OTHER PERSONNEL

The following personnel will be involved in portions of the Sustainable Seas Mission in the CINMS but will not require berthing aboard the McARTHUR:

NAME	Gender/Nationality	Project	Organization
Sean Hastings	M/USA	SSE	CINMS
Matt Pickett	M/USA	SSE	CINMS
Chris Mirabal	M/USA	SSE	CINMS

7.5 MEDICAL FORMS

All personnel participating on board will complete a NOAA Health Services Questionnaire prior to embarking on the vessel. Forms will be completed and submitted to the Commanding Officer per NOAA Corps Instruction 6000.

8.0 DATA RESPONSIBILITIES

8.1 DATA AND SAMPLES

8.1.1 The Chief Scientist via the Mission Coordinator is responsible for the data quality, disposition, and archiving of data and samples collected aboard the ship for the primary project. As the representative of the cruise sponsor, the Chief Scientist is also responsible for the dissemination of copies of these data to participants on the cruise and to any other requesters.

8.1.2 The Commanding Officer will give the acting Chief Scientist a single copy of all data collected by ship's personnel. The ships Scientific Computer System (SCS) will collect data continuously during the project. The SCS data will be provided to the Chief Scientist at the completion of the project. The Chief Scientist will provide the Commanding Officer a list of all data collected by the scientific party.

8.1.3 The Commanding Officer is responsible for all data collected for ancillary projects until those data have been transferred to the projects' Principal Investigator.

8.2 RECORDS AND REPORTS

8.2.1 Marine Operations Abstract (MOA). McARTHUR's officers will maintain the MOA during the cruise. The ship's position will be entered for all operations, and otherwise every 30 minutes or when changing course or speed. The Commanding Officer will give the Mission Coordinator a copy of the MOA at the completion of the project.

8.2.2 Pre Dive forms will be used to check out the sub prior to each dive and are the responsibility of the pilot and dive crew. Pre Dive forms will be signed by the Dive Supervisor.

8.2.3 Dive Logs will be used to keep track of the subs performance during each dive and are the responsibility of the Dive Supervisor or designee.

8.2.4 The Mission Coordinators Log will provide an accounting of the project work being conducted during each dive and are the responsibility of the Mission Coordinator.

8.2.5 The Mission Log will be based on a compilation of materials collected during dive operations (audio, video, photographs) and information collected post-dive (text provided by pilots), and will be posted on the NGS SSE Web site. The Mission Log is the responsibility of the Mission Log Coordinator.

8.2.6 The Mission Coordinator will complete the Ships Operations Evaluation Form and forward to the Office of NOAA Corps Operations.

8.2.6 All film collected during the cruise will be handled in accordance with the MOU between NOAA and NGS.

9.0 EQUIPMENT LISTS

9.1 SUPPLIED BY THE SCIENTIFIC PARTY:

(A) CTD
(B) Analytical Spectral Device (ASD)
(C) Tethered Spectral Radiometer Buoy (TSRB)

(D) Profiling Reflectance Radiometer (PRR)
(E) Filtering equipment
(F) 500 meter winch
(G) Sidescan fish
(H) Sidescan data acquisition computer
(I) Navigation computer
(J) Trunk containing spare sidescan parts

9.2 SUPPLIED BY THE McARTHUR:
(A)

9.3 SUPPLIED WITH THE SUBMERSIBLE:
(A) Parallel laser beams
(B) External digital camera
(C) Internal audio recorder
(D) GPS to navigate for transects
(E) Internal still camera - provided by the P.I.
(F) Internal digital video camera - provided by the P.I.

10.0 ADDITIONAL AND ANCILLARY PROJECTS

10.1 ADDITIONAL PROJECTS: Any other work done during the cruise period will be subordinate to the main project and performed so as to not interfere with that outlined in these instructions. The Chief Scientist will be responsible for determining the priority of additional work relative to the main project.

10.2 ANCILLARY PROJECTS: Ancillary projects are secondary to the objectives of the cruise, should be treated as additional investigations, do not have representation aboard, and are accomplished by the ship's force.

10.2.1 Ancillary tasks will be accomplished in accordance with the NOAA Fleet Standing Ancillary Instructions.

11.0 MISCELLANEOUS

11.1 Navigation Control: Shipboard DGPS provided for vessel. Submersible navigation provided by NUYTCO

11.2 Required Compliance: The Chief Scientist will require each Mission Coordinator to contact local authorities to increase the safety and awareness of the operations. These authorities include :

11.2.1 US Coast Guard Station responsible for the area of coverage in the cruise instructions.

11.2.2 Local Notice to Mariners in the district concerning the area covered in the cruise instructions.

11.2.3 Port Authority or Harbor master for potential dive sites.

11.3 Meals for all scientific party members will be charged to the host organization in accordance with NOAA Administrative Order 203-100. The Chief Scientist will provide the Commanding Officer with the appropriate accounting codes.

11.4 Pre-Cruise Meeting: A pre-cruise meeting between the Chief Scientist, the Commanding Officer, the Mission Coordinator, and the Dive Supervisor will be held prior to the commencement of operations to do a final review of the cruise plan.

11.5 Post-Cruise debrief: A post-cruise debriefing between the Chief Scientist, the Commanding Officer, the Mission Coordinator, the Dive Supervisor, and the Mission Coordinator for the next site will be held to review any problems that occurred.

11.6 HAZMATS

12.0 COMMUNICATIONS

12.1 McARTHUR will communicate daily, Monday through Friday, with the Pacific Marine Center. Normally this will be via email message, but radio contact will be maintained when possible.

12.2 Because the scientific staff must sometimes communicate with other research vessels, commercial vessels, and shore-based NOAA facilities, the Chief Scientist or his designee may request the use of radio transceivers aboard the vessel.

12.3 McARTHUR is equipped with INMARSAT and cellular telephone. The Chief Scientist may need access to these systems with permission from the Commanding Officer. The Commanding Officer will provide the Chief Scientist with a log of all calls made from the ship by the scientific party at the completion of the project.

13.0 APPENDICES

(A) List of Coordinates for tracklines or stations.

Projects #1 and #2

Dive#	Start	End
1	119.3690, 34.0510	119.3690, 34.0210
2	119.3433, 34.0450	119.3433, 34.0283
3	119.3383, 34.0083	119.3383, 34.0250
4	119.4267, 34.0367	119.4267, 34.0200

Project #3
Platform Gail: 119.4020, 34.1250

Project #4
Footprint: 119.4818, 33.9586

Project #5
Anacapa Island Landing Cove: 119.3508, 34.0024 to 119.3590, 34.0018

Project #6
See attached map of squid spawning habitats

Project #7
Donna's Reef: 119.4795, 33.9968
Milton's Reef: 119.4937, 34.0135

(B) Chartlets (attached)

(C) Emergency Contact phone number: Sanctuary Office in Santa Barbara (805)966-7107

(D) Shuttle/Launch schedule (attached)

_____	_____	_____	_____
John C. Albright	Date	LCDR Edward Cassano	Date
Rear Admiral, NOAA		Mission Coordinator	
Director, Pacific Marine Center		Channel Islands National Marine Sanctuary	

_____ _____

Sylvia Earle Date

Chief Scientist

Sustainable Seas Expeditions